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CITATION:

Ohta, Takao. Computer Simulations of Micro-Phase Separated Block Copolymers under an Oscillatory Shear Flow. 物性研究 1991, 57(3): 498-498

ISSUE DATE:

1991-12-20

URL:

http://hdl.handle.net/2433/94814

Computer Simulations of Micro-Phase Separated Block Copolymers under an Oscillatory Shear Flow

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We carry out computer simulations of micro-phase separated copolymer melts under an oscillatory shear flow. The cell dynamical system approach is used in two dimensions for the block ratio f=0.4, where disk-shaped micro-phase separated domains constitute a triangular lattice. We are concerned with the stress response by changing the frequency of flow. When the frequency is large but smaller than the concentration relaxation rate, the system exhibits an elastic response while when the frequency is decreased and the amplitude of the oscillation is sufficiently large, there occurs a phase difference between the applied strain and the shear stress. Our theoretical consideration of the results obtained is also described.

This work has been carried out in collaboration with Yoshihisa Enomoto, Masao Doi and Ayako Tetsuka.